

**Application for Locally Adopted Energy Standards
by the City of Pacifica in Accordance With
Section 10-106 of the California Code of Regulations,
Title 24, Part 1**

December 29, 2010

From:

Christina Horrisberger, Assistant Planner
City of Pacifica Planning & Economic Development Department
100 Francisco Boulevard
Pacifica, CA 94044
650.738.7341
Email: horrisberger@ci.pacifica.ca.us

Report prepared by:

Michael Gabel
Gabel Associates, LLC
1818 Harmon Street, Suite #1
Berkeley, CA 94703
(510) 428-0803
Email: mike@gabelenergy.com

Table of Contents

Executive Summary

Text of the Pacifica County Ordinance

Appendix: Climate Zone 3 Energy Cost-Effectiveness Study

Executive Summary

The Pacifica City Council adopted its Green Building Ordinance on December 13, 2010. This ordinance is scheduled to take effect on or around March 15, 2011. Gabel Associates has researched and reviewed the feasibility and energy cost-effectiveness of permit applicants exceeding the state's 2008 Building Energy Efficiency Standards in order to meet the minimum energy efficiency requirements of the proposed ordinance.

Overall Scope of the Ordinance

New ordinance or revision to previous ordinance?	New Ordinance
Projected Effective Date:	March 15, 2011
Green building or stand-alone energy ordinance?	Green Building Ordinance
Do minimum energy requirements increase after initial effective date?	Yes, in a few instances.
Occupancies covered?	Residential and Nonresidential Buildings
Energy requirements apply to new construction, additions, alterations?	New Construction, Additions and Alterations
Special or unusual energy requirements?	No
Third party verification?	No
Implementation details in the ordinance or in a separate document?	Administrative Bulletin on meeting the LEED energy requirement with 15% better than 2008 Title 24

Key Features of the Ordinance By Occupancy Type

Occupancy Type	General Requirements	Minimum Energy Requirement Effective March 15, 2011
Low-rise Residential Buildings ≤ 3 Dwelling Units	<i>(Some general requirements increase in Year 2 and Year 3 after Ordinance adoption.)</i>	
All Construction Valued at ≥ \$100,000	GPR or LEED Checklist < \$200,000	15% Better-than-Title 24
	GRP or LEED Certified ≥ \$200,000	15% Better-than-Title 24
In Homes > 2,800 sf	GRP ≥ 100 points	15% Better-than-Title 24
Nonresidential & Residential Buildings ≥ 4 Dwelling Units	<i>(Some general requirements increase in Year 2 and Year 3 after Ordinance adoption.)</i>	
All Construction < \$100,000	LEED Checklist (LEED Certified starting Year 2 after adoption)	Year 2: LEED Minimum or 15% Better-than-Title 24
All Construction > \$100,000 and > \$200,000	LEED Certified (LEED Silver starting Year 2 after adoption)	LEED Minimum or 15% Better-than-Title 24
All Construction > \$200,000	LEED Silver (LEED Gold starting Year 2 after adoption)	LEED Minimum or 15% Better-than-Title 24

ORDINANCE NO. _____

**AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF PACIFICA
ADDING CHAPTER 21 TO TITLE 8 OF THE PACIFICA MUNICIPAL
CODE TO REQUIRE GREEN BUILDING MEASURES FOR
CONSTRUCTION PROJECTS**

The City Council of the City of Pacifica does hereby ordain as follows:

SECTION 1. FINDINGS. The City Council of the City of Pacifica hereby finds and declares as follows:

- a. The proposed new Chapter 21 of Title 8 of the Pacifica Municipal Code, “Green Building,” preserves and enhances the environment, in that it sets forth minimum green building requirements within the City of Pacifica for all construction projects requiring a building permit;
- b. The City of Pacifica’s General Plan sets forth goals for preserving and improving the natural and built environments of the City, protecting the health of its residents and visitors and fostering its economy;
- c. The demolition, design, construction, and maintenance of buildings and structures within the City has a significant impact on the City’s environmental sustainability, resource usage and efficiency, greenhouse gas emissions, waste management, and the health and productivity of residents, workers, and visitors;
- d. Green building practices recognize the relationship between natural and built environments. Green building design, siting, construction, and operation can have a significant positive effect on energy and resource efficiency, reduction of waste and pollution generation, and the health and productivity of a building's occupants over the life of the building;
- e. Green building benefits are spread throughout the systems and features of the building to foster healthy indoor air quality. Green buildings may use recycled content building materials, consume less natural resources and produce less waste than conventional buildings;
- f. Summer ambient temperatures, average load demand and peak load demand of energy are important factors concerning public health and safety in the San Francisco Bay Area. A reduction of total and peak energy use, as a result of incremental energy conservation measures required by this ordinance, will have local and regional benefits;
- g. It is critical to the economic and environmental health of the City of Pacifica that the City provide leadership to both the private and public sectors in the arena of energy efficiency, Smart Growth and “green” construction;

- h. The City Council of the City of Pacifica makes the finding of necessity that adoption of this ordinance, which includes modifications to Health and Safety Code Sections 17958. 17958.5 and 17958.7, is reasonably necessary, because of local climatic, geologic or topographical conditions. Specifically, the Council finds that the following local conditions exist in Pacifica:
- i. **Sea level rise:** Pacifica is located adjacent to the Pacific Ocean and significant areas of the City would be impacted by sea level rise due to global warming. According to a paper prepared by researchers from Scripps Institution of Oceanography, the University of California San Diego, the U.S. Geological Survey, Santa Clara University, the Department of Boating and Waterways, and Hydrologic Research Center, sea level is projected to rise 16” by 2050 and 55” by 2100 (source: A Report on Sea Level Rise Preparedness; Staff Report to the State Lands Commission, December 2009). The Pew Center on Climate Change has reported that this would result in the erosion of beaches, marshes and wetlands and increased salinity of estuaries, marshes, streams and aquifers. In recent years, Pacifica’s coastal bluffs have undergone significant erosion causing property damage and displacement of Pacifica residents. Increased salinity has the potential to negatively impact fresh water supplies and damage or destroy crops in low lying farmlands.
 - ii. **Impacts on water:** Water quality and quantity are at risk as a result of changing temperatures. With warmer temperature, more precipitation will fall in the form of rain instead of snow, shortening the winter snowfall season and accelerating the rate at which the snowpack melts in the spring. Not only does such snow melt increase the threat of spring flooding, it will decrease the Sierra’s capacity as a natural water tower, resulting in decreased water availability for agricultural irrigation, hydroelectric generation and the general needs of a growing population. The Sierra snow-pack is the primary source of the Tuolumne River, the primary source of water for Pacifica.
 - iii. **Natural disasters:** Climate models predict a 4°F temperature increase in the next 20 to 40 years, with an increase in the number of long dry spells, as well as a 20-30% increase in precipitation in the spring and fall. More frequent and heavier precipitation causes flooding and mudslides, which would incur considerable costs in damages to property, infrastructure and even human life. In addition, the increases of wildfires due to continued dry periods and higher temperatures is another expected impact of continued climate change. In these conditions, fires burn hotter and spread faster.
 - iv. **Public health impact:** Warming temperatures and increased precipitation can also encourage mosquito-breeding, thus engendering diseases that come with mosquitoes, such as West Nile Virus, a disease of growing concern in Pacifica and the surrounding region.

- v. **Impacts on plants and vegetation:** Native plants and animals are also at risk as temperatures rise. Scientists are reporting more species moving to higher elevations or more northerly latitudes in response. Increased temperatures also provide a foothold for invasive species of weeds, insects and other threats to native species. The increased flow and salinity of water resources could also seriously affect food web and mating conditions for fish that are both of economic and recreational interest to residents;
- i. This proposed Ordinance is intended to preserve and enhance the environment within the City of Pacifica and is not subject to the California Environmental Quality Act pursuant to Section 15061(b)(3) of the CEQA Guidelines, because there is no possibility that the ordinance may have a significant negative impact on the environment and is exempt from the requirements of CEQA pursuant to Section 15308 of the CEQA Guidelines, which exempts actions taken by regulatory agencies for the enhancement and protection of the environment;
- j. Nothing in this Ordinance shall require the Applicant to use covered products, as defined in the federal Energy Policy and Conservation Act (42 U.S.C. § 6201 et seq), that exceed any applicable federal energy conservation standards for such products; and
- k. This ordinance is intended to ensure that all buildings subject to it will consume no more energy than what is permitted by the 2008 California Building Energy Efficiency Standards (Title 24, Part 6) of the California Building Code.

SECTION 2. PURPOSE. It shall be the purpose of the Green Building Ordinance to enhance public health and welfare by encouraging green building measures in design, construction and maintenance of buildings. The green building practices referenced in this chapter are intended to achieve the following goals:

- a. To encourage the conservation of natural resources;
- b. To reduce waste generated from construction projects;
- c. To increase energy and water efficiency and decrease energy and water usage;
- d. To reduce the operating and maintenance costs for buildings;
- e. To promote the health and productivity of residents, workers and visitors to the City;
- f. To promote healthier indoor environments; and
- g. To implement Smart Growth measures.

SECTION 3. DEFINITIONS. For the purpose of this chapter, unless otherwise apparent from the context, the following terms are defined as set forth below:

- a. “Applicable Projects” are as described in Section 4 of this chapter.
- b. “Applicant” shall mean the property owner, or a person or persons authorized by the property owner, to act as their agent in processing building and/or development permits issued by the City.
- c. “Build It Green™” shall mean the non-profit organization that administers the GreenPoint Rated residential green building verification program.
- d. “City sponsored project” shall mean any construction project for which the City of Pacifica participates in the initiation of, or development or redevelopment of, or provides equity or funding for, that upon completion will provide a community service and/or accommodate City staff.
- e. “Construction project” shall mean any activity that involves the construction, renovation or demolition of a building and that requires issuance of a building permit.
- f. “Dwelling” means a single unit of residence for a family of one or more persons. Examples of dwelling units include condominiums, apartment units within apartment buildings, and other types of dwellings in which sleeping accommodations are provided but toileting or cooking facilities are shared by the occupants of more than one room or portion of the building.
- g. “Enhanced Commissioning” means the credit, in the Energy and Atmosphere category of the applicable LEED™ Rating System checklist, intended to ensure that certified buildings are designed, constructed, and calibrated to operate as intended.
- h. “Graywater” shall mean untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated, or unhealthy bodily wastes, and does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes. Graywater includes, but is not limited to, wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines, and laundry tubs, but does not include wastewater from kitchen sinks or dishwashers.
- i. “Green building” shall mean a whole systems approach to design, construction, location and operation of buildings and structures that helps to mitigate the environmental, economic, and social impacts of construction, demolition and renovation of buildings. Green building practices recognize the relationship between the natural and built

environments and seek to minimize the use of energy, water and other natural resources and promote a healthy, productive indoor environment.

- j. “Green Building Compliance Official” shall mean the Building Official of the City of Pacifica or his or her designee.
- k. “GreenPoint Rated (GPR)” shall mean the version of the applicable GreenPoint Rated system approved by Build It Green™, in effect at the time of project application for a building permit.
- l. “GreenPoints” shall mean credits assigned under the applicable GreenPoint Rated Checklist for a residential construction project.
- m. “Hardship” means a verifiable level of project related difficulty or adversity, beyond the control of the applicant, as a result of which the applicant cannot reasonably comply with the requirements of this Chapter. Examples of hardship include, but are not limited to, situations where the cost of achieving compliance with this chapter is disproportionate to the overall cost of the project, where there is a lack of commercially available green building materials and technologies to comply with this chapter’s requirements, where physical conditions associated with the project site make it impractical to comply with this chapter or where compliance would impair the historic integrity of a listed historic structure.
- n. “LEED® certification” shall mean having earned a “Certified” or higher rating in the applicable Leadership in Energy and Environmental Design (LEED) Rating System.
- o. “LEED Gold certification” shall mean having earned a “Gold” rating in the applicable Leadership in Energy and Environmental Design (LEED) Rating System.
- p. “LEED Rating System” shall mean the applicable version of the Leadership in Energy and Environmental Design (LEED) rating system, approved by the U.S. Green Building Council (USGBC), in effect at the time of project application for a building permit.
- q. “LEED Silver certification” shall mean having earned a “Silver” rating in the applicable Leadership in Energy and Environmental Design (LEED) Rating System.
- r. “Mixed-use project” shall mean a construction project that includes both dwelling and non-residential units.
- s. “Non-residential project” shall mean a construction project that does not include dwelling units.

- t. “Project valuation” shall mean the value of a construction project, as determined by the formula, in effect at the time of project application, used to calculate building permit fees by the City’s Building Division. This includes the aggregate value of: (1) the construction project for which the applicant seeks the development and/or building permit; (2) any pending construction projects that were not considered Applicable Projects under this Ordinance and have not yet received all final City approvals for completion of the project; and (3) any construction projects that were not considered Applicable Projects under this Ordinance and received final City approvals for completion of the project less than one year prior to the submittal of an application for the building and/or development permit.
- u. “Qualified green building professional” shall mean a LEED Accredited Professional or Build It Green Certified GreenPoint Rater or Advisor, or similar qualifications if acceptable to the Green Building Compliance Official.
- v. “Rainwater harvesting” shall mean the gathering, or accumulating and storing, of rainwater for reuse on-site.
- w. “Recycled Water” shall mean non-potable wastewater that has been treated and is suitable for beneficial reuse.
- x. “Residential project” shall mean a construction project that consists of one or more dwelling units. Accessory buildings may be included in residential projects.
- y. “Smart Growth” means development that revitalizes central cities and older suburbs, supports and enhances public transit and promotes walking and bicycling.
- z. “Solar power” shall mean energy from the sun that is converted into thermal or electrical energy.
- aa. “USGBC” shall mean the United States Green Building Council.

SECTION 4. STANDARDS FOR COMPLIANCE.

a. **Project Applicability and Requirement Table.** The purpose of the following table is to establish minimum compliance levels and minimum requirements for new construction projects and alterations and additions to existing buildings, with more intensive projects requiring a higher degree of green building measure implementation, and with more intensive green building measure implementation required over time. In addition to the following requirements, all buildings within the jurisdiction of the City of Pacifica must demonstrate compliance with the 2008 California Building Energy Efficiency Standard (Title 24, Part 6) of the California Building Code.

PROJECT TYPE	Applicable Projects¹	<u>Minimum Requirements:</u> Year 1 Following Ordinance Adoption	<u>Minimum Requirements:</u> Year 2 Following Ordinance Adoption	<u>Minimum Requirements:</u> Year 3 Following Ordinance Adoption and afterward
City Sponsored	All LEED® eligible projects.	LEED Silver certification required	LEED Gold certification required	Meet Year 2 requirement and obtain Enhanced Commissioning credit
Non-residential, Mixed-use and Multi-family Residential of 4 or more units				
Level 1	Project valuation under \$100,000	Include LEED checklist, indicating all measures with which the project complies.	LEED certification required.	Meet Year 2 requirement and obtain Enhanced Commissioning credit
Level 2	Project valuation \$100,000 – 199,999	LEED certification required.	LEED Silver certification required.	Meet Year 2 requirement and obtain Enhanced Commissioning credit
Level 3	Project valuation \$200,000 or more	LEED Silver certification required.	LEED Gold certification required.	Meet Year 2 requirement and obtain Enhanced Commissioning credit
1-3 Residential Units				
Level 1	Project valuation under \$100,000	GPR or LEED checklist, indicating all measures with which the project complies.	Same as year 1. Revised requirements to be determined at annual review.	Same as year 1. Revised requirements to be determined at annual review.

¹ Determine project valuation using City of Pacifica's building permit formula.

1-3 Residential Units (continued)				
Level 2	Project valuation \$100,000 – 199,999	GPR or LEED checklist, indicating all measures with which the project complies. In addition, energy efficiency at least 15% beyond Title 24 requirements must be attained.	Same as year 1. Revised requirements to be determined at annual review.	Same as year 1. Revised requirements to be determined at annual review.
Level 3	Project valuation \$200,000 or more AND where the project results in individual dwellings of less than 2,800 square feet in size, not including the garage.	Certified under GPR OR LEED	Same as year 1. Revised requirements to be determined at annual review.	Same as year 1. Revised requirements to be determined at annual review.
Level 4	a) New residential construction projects with one or more dwelling of 2,800 square feet or larger, not including the garage b) Alterations and additions to residential projects that result in one or more dwelling of 2,800 square feet or more of floor area, not including the garage AND project valuation of \$100,000 or more.	Certified under LEED OR GPR system. If the GPR system is used, a minimum of 100 points shall be obtained.	Same as year 1. Revised requirements to be determined at annual review.	Same as year 1. Revised requirements to be determined at annual review.

All Construction and/or Demolition Projects	All projects that include building construction and/or demolition	In addition to the above, construction and demolition waste shall be diverted from landfills and/or incinerators—for residential projects to the extent required to attain GPR certification; for all other projects to the extent required to earn 1 LEED point Documentation indicating compliance with this provision is required.	In addition to the above, construction and demolition waste shall be diverted from landfills and/or incinerators—for residential projects to the extent required to attain GPR certification; for all other projects to the extent required to earn 2 LEED points Documentation indicating compliance with this provision is required.	Same as Year 2
--	---	--	---	----------------

SECTION 5. SUBMITTAL AND REVIEW OF GREEN BUILDING DOCUMENTATION.

- a. **Submission of green building documentation.** In order to receive the necessary permit(s), in conjunction with any application for approval of a development permit or building permit, the applicant shall submit to the Green Building Compliance Official documentation, prepared by a qualified green building professional, indicating the measures that will be taken to achieve the applicable green building standards required by this Chapter ("Green Building Documentation"). The Green Building Documentation shall include:
 - (1) The applicable GPR or LEED green building project checklist in the plan set;
 - (2) Any other documentation that may be necessary to show compliance with this Chapter, as determined by the Green Building Compliance Official.
- b. **Review and acceptance of Green Building Documentation.** The Green Building Compliance Official shall only accept the Green Building Documentation if such documentation indicates that the covered project can achieve the applicable green building standards, as set forth in this Chapter. If the Green Building Compliance Official determines that these conditions have been met, the Green Building Documentation shall be accepted as complete.

In the event that the Green Building Compliance Official determines that the documentation is incomplete or insufficient to indicate that the covered project will meet the required green building standards, the Green Building Compliance Official shall identify the reasons for the determination and identify any additional information that is needed. The Green Building Compliance Official may retain the services of a consultant having expertise in green building techniques to review and evaluate the material and provide recommendations as to methods for compliance with the requirements of this Chapter. The cost of such consultant shall be paid by the applicant.

SECTION 6. FINAL CERTIFICATION.

- a. A Certificate of Occupancy shall not be issued until and unless the Green Building Compliance Official has determined that the project has implemented green building measures substantially in accord with this chapter.

SECTION 7. VOLUNTARY ACTIONS.

- a. **Renewable Energy.** Applicants are encouraged to install renewable energy systems.
- b. **Rainwater Harvesting.** Applicants are encouraged to install rainwater harvesting systems.
- c. **Water Reuse.** Applicants are encouraged to install systems to facilitate the use of graywater, and of recycled water in the future.
- d. **Subdivisions.** Applicants are encouraged to cluster buildings, minimize impervious surface cover, and utilize site design that discourages automobile usage and promotes outdoor activity. Applicants are encouraged to refer to LEED for Neighborhood Design as a guideline.
- e. **Non-covered Projects.** Applicants are encouraged to incorporate green building measures to the maximum extent practicable, even in cases where no formal certification is required.

SECTION 8. ALTERNATIVE COMPLIANCE.

- a. The Green Building Compliance Official may accept an alternative to the criteria set forth in this Chapter, if the Green Building Compliance Official finds that the alternative includes measures that increase energy and resource conservation to an extent consistent with the intent of this Chapter.

SECTION 9. EXCEPTIONS.

- a. In the event of hardship, the Green Building Compliance Official may grant exceptions to this Chapter. Applications for exceptions shall be filed with the

Green Building Compliance Official on a form provided by the City. The application form must be complete, signed and accompanied by documents that enable the City to reasonably determine that a hardship exists. In order to grant an exception, the Green Building Compliance Official must find that hardship exists, that the project is as nearly in compliance with the requirements set forth in this Chapter as is reasonably possible and that the project fully complies with the requirements of the 2008 California Building Energy Efficiency Standards (Title 24, Part 6) of the California Building Code.

SECTION 10. APPEALS.

- a. Any person aggrieved by decisions of the Green Building Compliance Official may appeal the decision to the City Council. The appellant shall file the appeal in accordance with Title 1, Chapter 4 of this Code.

SECTION 11. SEVERABILITY.

- a. If any section, subsection, sentence, clause, phrase or portion of this chapter is for any reason held to be invalid or unconstitutional by the decision of any court of competent jurisdiction, such decision shall not affect the validity of the remainder of this chapter. The City Council declares that it would have adopted this chapter and each section, subsection, sentence, clause, phrase or portion thereof, irrespective of the fact that any one or more sections, subsections, phrases or portions be declared invalid or unconstitutional.

*

*

*

*

The foregoing ordinance was introduced at the City Council meeting held on the 22nd day of November, 2010 and adopted at the meeting held on the ____ day of _____, 2010, by the following vote:

AYES, Councilmembers:

NOES, Councilmembers:

ABSENT, Councilmembers:

ABSTAIN, Councilmembers:

Sue Digre, Mayor

ATTEST:

Kathy O'Connell, City Clerk

APPROVED AS TO FORM:

Cecilia M. Quick, City Attorney

CITY OF PACIFICA CITY COUNCIL AGENDA

MAYOR SUE DIGRE
MAYOR PRO TEM MARY ANN NIHART
COUNCILMEMBER PETE DEJARNATT
COUNCILMEMBER JIM VREELAND
COUNCILMEMBER JULIE LANCELLE

CITY COUNCIL CHAMBERS
2212 BEACH BOULEVARD
PACIFICA, CALIFORNIA 94044

December 13, 2010

www.cityofpacifica.org

Off-street parking is allowed by permit for attendance at official public meetings. Vehicles parked without permits are subject to citation. You should obtain a permit from the rack in the lobby and place it on the dashboard of your vehicle in such a manner as is visible to law enforcement personnel.

Call to Order – Open Meeting

6:30 P.M.

CLOSED SESSION ITEM:

1. PURSUANT TO GOVERNMENT CODE SECTION 54956.8 Conference with Real Property Negotiator. Discussion concerns price and terms of payment. Agency Negotiator Attending Session: Stephen Rhodes. Property: 1220 Linda Mar Blvd., Pacifica, California. Negotiating Parties: City of Pacifica and Andrew G. Leone.

The public will have an opportunity to comment on these items before the City Council goes into closed session.

RECONVENE TO OPEN SESSION

7:00 p.m.

Call to Order
Roll Call
Salute to the Flag led by Councilmember Lancelle
Commission Liaisons:
Closed Session Report:

CONSENT CALENDAR

Items on the consent calendar will be adopted by one motion unless a Councilmember or person in the audience requests, before the vote on the motion, to have an item discussed under the Consideration portion of the agenda. Time limit on comments is three minutes or less.

1. Approval of Disbursements dated 11/15/10 to 11/19/10 in the amount of \$485,650.18. Regular and quick checks numbered 81913 to 81915 and 11307 to 11478; Approval of disbursements dated 11/29/10 to 12/03/10 in the amount of \$589,251.64 Regular and quick checks numbered 81916 to 81919 (**Proposed action:** approve)
2. Approval of Minutes of Regular City Council Meeting of November 22, 2010 (**Proposed action:** approve)
3. Purchase of \$76,997.64 for ATV Ranger, Hose and Tools and Equipment, [\$60,706 From Fund 8 – Fire Assessment Fund, (Small Equipment 08.860630.52304.0000.000) \$12,431.00 from Miscellaneous Revenue – Donations 920000.48928, and \$3,860.54 from Fire Department General Fund – Departmental Expenses 01.600630-52300] (**Proposed action:** authorize the expenditure of \$76,997.54 for the purchase of an off road vehicle and various hose, tools and equipment of which \$60,706 is from Fund 8; \$12,431.00 is from community donations; and \$3,860.54 is from 01.600630.52300 general fund fire operating budget)

4. Award of Contract to Stoloski & Gonzalez, Inc in the Amount of \$101,210 for the Collection System Projects: Sanitary Sewer Mainline Replacement at Avalon Drive and Edgemar Avenue [Sewer Facility Construction Fund 34, Account No. 34.9000000.52800.C005.000 – Collection System] (**Proposed action:** authorize the City Manager to enter into the attached agreement with Stoloski & Gonzalez, Inc. the Collection System Projects: Sanitary Sewer Mainline Replacement at Avalon Drive and Edgemar Avenue)
5. Notice of Completion for the Various Federal-Aid Street Pavement Rehabilitation Project (**Proposed action:** adopt the resolution next in order a resolution of the City Council of the City of Pacifica accepting completion and directing the City Manager to file Notice of Completion for the Various Federal-Aid Street Pavement Rehabilitation project)
6. Amending Resolution No. 51-2009 to Extend the Financing City Services Task Force (**Proposed action:** adopt the resolution entitled “A Resolution of the City Council of the City of Pacifica Amending Resolution No. 51-2009 to Extend the Financing City Services Task Force to December 31, 2015)
7. Amending Resolution No. 79-2009 to Extend the Green Building Task Force (**Proposed action:** move that the City Council adopt the resolution entitled “A Resolution of the City Council of the City of Pacifica Amending Resolution 79-2009 to Extend to the Green Building Task Force to December 31, 2012)
8. Award of Three Year Contracts to Go Native, Inc i) for the Implementation of the Habitat Management Plan for Depressional Wetlands Areas Designated as Snake Habitat in the Amount of \$34,295; ii) for the Management of Cape Ivy Infestation in the Upper Section of Calera Creek in the Amount of \$39,000; and iii) for the Invasive Non-Native Plant Control for the Calera Creek Riparian Corridor and Immediate Areas in the Amount of \$41,550 [Sewer Facility Construction Fund 34, Account No. 34.9000000.52800.P011.000 – Calera Creek Wetland Compliance] (**Proposed action:** authorize the City Manager to enter into the attached agreements with Go Native Inc. i) for the implementation of the Habitat Management Plan for Depressional Wetlands Areas Designated as Snake Habitat in the amount of \$34,295; ii) for the management of the Cape Ivy infestation in the upper section of Calera Creek in the amount of \$39,000; and iii) for the invasive non-native plant control for the Calera Creek Riparian corridor and immediate areas in the amount of \$41,550)
9. Adoption of a ordinance entitled, “An Ordinance of the City Council of the City of Pacifica Adding Chapter 21 to Title 8 of the Pacifica Municipal Code to Require Green Building Measures for Construction Project” Second Reading (**Proposed action:** adopt the ordinance entitled “An Ordinance of the City Council of the City of Pacifica Adding Chapter 21 to Title 8 of the Pacifica Municipal Code to Require Green Building Measure for Construction Projects”)
10. Approve Purchase of 2011 Isuzu Box Truck from Tom’s Truck Center in the Amount of \$52,860.19 and Approve Additional Budget Authority from the Vehicle Replacement Fund 72 Reserve to Account #72-92-0760-55110-0000-000 (**Proposed action:** approve purchase of Isuzu NQR Box Truck in the amount of \$52,860.19; approve additional budget authority from the Vehicle Replacement Fund 72 Reserve to Account #72-92-0760-55110-0000-000 and authorize the City Manager to sign the purchase contract)
11. Cancellation of December 27, 2010 City Council Meeting (**Proposed action:** approve cancellation of the December 27, 2010 City Council meeting)
12. Authorization to Enter into Change Order No. 3 in the Amount of \$91,800 with RMC Water and Environment (RMC) for the City of Pacifica Wastewater Collection System Master Plan [Sewer Facility Construction Fund 34, Account No. 34.9000000.52800.C007.000 – Sewer System Master Plan] (**Proposed action:** authorize the City Manager to enter into Change Order No. 3 with RMC Water and Environment for the City of Pacifica Wastewater Collection System Master Plan in the amount of \$91,800 and extend the Project Completion Date to October 31, 2011)

13. Continuance of Proclamation Confirming Existence of Local Emergency (**Proposed action:** move to continue the proclamation confirming existence of a local emergency dated April 12, 2010)
14. Notice of Completion for the Collection System Projects: Sanitary Sewer Mainline Replacement at Lewis Lane (**Proposed action:** adopt the resolution next in order accepting and directing the City Manager to file Notice of Completion for the Collection System Projects: Sanitary Sewer Mainline Replacement at Lewis Lane, and authorize the City Manager to release the retention money withheld from Pacific Trenchless, Inc)
15. Authorization to Advertise for Sealed Bids to Purchase a New Centrifuge Unit and Its Appurtenances for the Calera Creek Water Recycling Plant (**Proposed action:** authorize staff to advertise for sealed bids to purchase a new centrifuge unit and its appurtenances for the Calera Creek Water Recycling Plant)
16. Reject All Bids Received and Direct Staff to Modify Design and Authorize Staff to Re-Advertise for Sealed Bids the Department of Public Works Corporation Yard Roof Repair Project (**Proposed action:** reject all bids and direct staff to modify design and authorize staff to re-advertise for sealed bids the Department of Public Works Corporation Yard Roof Repair Project)
17. Adoption of the California Emergency Management Agency (CALEMA) Federal Emergency Management Agency (FEMA) Universal Authorized Agent Resolution Form 130 to facilitate the City's Disaster Project Program (**Proposed action:** adopt the universal authorized agent resolution form 130)
18. Contract for Employment of James Saunders as Interim Police Chief (**Proposed action:** authorize the City Manager to execute the Agreement for Temporary Services with James Saunders for the position of interim Police Chief)

SPECIAL PRESENTATION

- ❖ Proclamation – BJ Nathanson
- ❖ Proclamation - Police Chief Jim Saunders
- ❖ Proclamation - Planning Director Michael Crabtree
- ❖ Proclamation - Terra Nova Football Team

PUBLIC HEARING

During public hearings, an applicant or their agent and appellants have ten minutes for their opening presentation and three minutes for rebuttal before the public hearing is closed. Members of the public are limited to three minutes.

19. Adoption of an Interim Ordinance Adopting a Citywide Moratorium Temporarily Prohibiting New PayDay Lenders Pending Further Study (**Proposed action:** move that the City Council read the attached ordinance entitled "An Ordinance of the City Council of the City of Pacifica, Adopting a Citywide Moratorium on Payday Lender Facilities and Declaring the Urgency Thereof" by title only and waive reading beyond the title, and adopt the ordinance)

COUNCIL COMMUNICATIONS

The purpose of Council Communications is for Councilmembers to inform each other of items of potential interest to other Councilmembers, such as interagency meetings.

ORAL COMMUNICATIONS

This portion of the Agenda is available for the public to address the City Council on any issue that is not on the Agenda. Any person wishing to address the Council shall be recognized by the Mayor during Oral Communications, provided, however, that during the Oral Communications portion of the agenda, only items not on the agenda for that meeting may be addressed. All remarks shall be addressed to the Council as a body and not to any member thereof. Councilmembers shall not enter into debate with speakers under Oral Communications. A maximum time of three minutes will be allowed for any speaker. Pursuant to Pacifica Municipal Code Title 2, Chapter 1, Section 2-1.118 any person making impertinent, slanderous, or profane remarks or who becomes boisterous while addressing the Council shall be called to order by the presiding officer

and, if such conduct continues, may, at the direction of the presiding officer, be ordered barred from further audience before the Council during the meeting.

CONSIDERATION

20. Approve Purchase of Street Lights from Heritage Casting and Ironworks (HCI) in the Amount of \$109,250. No Budget Authority is Necessary as Enough Funds Had Been Previously Budgeted with the Adoption of the FY 2010-2011 Budget in the General Capital Improvement Fund Account No. 22.9000000.52800.0216.006 (**Proposed action:** approve the purchase order for fifty (50) pieces of the ornamental/decorative LED streetlights from Heritage Casting & Ironworks; authorize the City Manager to sign the purchase agreement)
21. Appointments to be Considered by the City Selection and by the San Mateo County Council of Cities (**Proposed action:** staff recommends that the City Council give direction to the Mayor, as the voting member on the City Selection Committee or the Councilmember holding the Mayor's proxy regarding the appointments at the December 17, 2010 City Selection Committee meeting and San Mateo County Council of Cities)

ADJOURN

NOTICE: If you challenge a city's zoning, planning or other decision in court, you may be limited to raising only those issues you or someone else raised at the public hearing described in this notice, or in written correspondence delivered to the City Council at, or prior to, the public hearing. Judicial review of any city administrative decision may be had only if a petition is filed with the court not later than the 90th day following the date upon which the decision becomes final. Judicial review of environmental determinations may be subject to a shorter time period for litigation, in certain cases 30 days following the date of final decision.

The City of Pacifica will provide assistance for disabled citizens upon at least 24 hours advance notice to the City Manager's Office (650) 738-7301, or send request via email to: o'connellk@ci.pacifica.ca.us If you need sign language assistance or written material printed in a larger font or taped, advance notice is necessary. All meeting rooms are accessible to the disabled.

The Pacifica Municipal Code is available on line at the City's website (www.cityofpacifica.org); at the website, scroll down to find the Link.

HOW TO OBTAIN CITY COUNCIL AGENDAS

Posted agendas:

Agendas are posted the Friday prior to the City Council meeting date, at the entrance to City Hall, 170 Santa Maria Avenue

View on the Internet:

Follow the link to Council agenda, at www.cityofpacifica.org

E-mail subscription:

Send a request to Kathy O'Connell, at o'connellk@ci.pacifica.ca.us

City Clerk's Office/City Manager's Office

City Hall, 170 Santa Maria Avenue, 2nd Floor

Council meetings:

Agendas are available at the City Council meeting

HOW TO OBTAIN CITY COUNCIL AGENDA PACKET MATERIALS

City Clerk's Office or the Library:

A copy of the complete agenda packet is available for public review on the Friday prior to the City Council meeting, at the Pacifica Library, 104 Hilton Way or the Sanchez Library, 1111 Terra Nova Blvd., Pacifica

View staff reports on the Internet:

Follow the link to Council agenda, www.cityofpacifica.org

Council meetings:

A complete agenda packet is available for review at the City Council meeting.

HOW TO REACH YOUR LEGISLATORS

- Governor Arnold Schwarzenegger, State Capitol Building, Sacramento CA 95814 (916) 445-2841
- State Senator Leland Yee, 400 So. El Camino Real, Ste. 630, San Mateo, CA 94402 (650) 340-8840
- Assemblymember Jerry Hill, 1528 So. El Camino Real, Ste 302, San Mateo CA 94402 (650) 341-4319
- Congresswoman Jackie Speier, 400 So. El Camino Real, Ste 750 San Mateo CA 94402 (650) 342-0300
- Senator Barbara Boxer, 1700 Montgomery Street, Ste 240, San Francisco CA 94111 (415) 403-0100
- Senator Dianne Feinstein, #1 Post Street, Ste 2450, San Francisco CA 94104 (415) 393-0710
- President Barack Obama, 1600 Pennsylvania Ave. NW, Washington DC 20500 (202) 456-1111

Appendix: Climate Zone 3 Energy Cost-Effectiveness Study

Codes and Standards Title 24 Energy-Efficient Local Ordinances

Title: Climate Zone 3 Energy Cost-Effectiveness Study

Prepared for:

Pat Eilert
Codes and Standards Program
Pacific Gas and Electric Company

Maril Pitcock
Government Partnership Program
Pacific Gas and Electric Company

Prepared by:
Gabel Associates, LLC

Last Modified: July 19, 2010



Climate Zone 3 Energy Cost-Effectiveness Study

July 19, 2010

Report prepared by:

Michael Gabel of Gabel Associates, LLC
1818 Harmon Street, Suite #1 Berkeley, CA 94703
(510) 428-0803 Email: mike@gabelenergy.com

Report on behalf of:

Pacific Gas and Electric Company's Codes and Standards Program,
Pat Eilert, 202 Cousteau Place, Davis, CA 95616
(530) 757-5261 Email: PLE2@pge.com

Pacific Gas and Electric Company's Government Partnership Program,
Maril Pitcock, 245 Market, San Francisco, Room 687, CA 94105
(415) 973-9944 Email: MxWL@pge.com

LEGAL NOTICE

This report was prepared by Pacific Gas and Electric Company and funded by the California utility customers under the auspices of the California Public Utilities Commission.

Copyright 2009 Pacific Gas and Electric Company. All rights reserved, except that this document may be used, copied, and distributed without modification.

Neither PG&E nor any of its employees makes any warranty, express or implied; or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any data, information, method, product, policy or process disclosed in this document; or represents that its use will not infringe any privately-owned rights including, but not limited to, patents, trademarks or copyrights.

Table of Contents

1.0 Executive Summary	1
2.0 Methodology and Assumptions	2
3.0 Minimum Compliance With 2008 Standards	4
4.0 Incremental Cost to Exceed Title 24 By 15%	9
5.0 Cost-Effectiveness Determination.	23

1.0 Executive Summary

This report presents the results of Gabel Associates' research and review of the feasibility and energy cost-effectiveness of building permit applicants exceeding the 2008 Building Energy Efficiency Standards to meet the minimum energy-efficiency requirements of local energy efficiency standards covering Climate Zone 3. A local government may use this report as a basis for demonstrating energy cost-effectiveness of a proposed green building or energy ordinance. The study assumes that such an ordinance requires, for the building categories covered, that building energy performance exceeds the 2008 TDV energy standard budget by at least 15%.

The study is also contained in the local government's application to the California Energy Commission (CEC) which must meet all requirements specified in Section 10-106 of the California Code of Regulations, Title 24, Part 1, Article 1: Locally Adopted Energy Standards. An ordinance shall be legally enforceable (a) after the CEC has reviewed and approved the local energy standards as meeting all requirements of Section 10-106; and (b) the ordinance has been adopted by the local government and filed with the Building Standards Commission.

The 2008 Building Energy Efficiency Standards, which took effect on January 1, 2010, are the baseline used to calculate the cost-effectiveness data.

2.0 Methodology and Assumptions

The energy performance impacts of exceeding the performance requirements of the 2008 Title 24 Building Energy Efficiency Standards (2008 Standards) have been evaluated in Climate Zone 3 using the following residential and nonresidential prototypical building types:

Small Single Family House 2-story 2,025 sf	Large Single Family House 2-story 4,500 sf
Low-rise Multi-family Apartments 8 dwelling units/2-story 8,442 sf	High-rise Multi-family Apartments 40 dwelling units/4-story 36,800 sf
Low-rise Office Building 1-story 10,580 sf	High-rise Office Building 5-story 52,900 sf

Methodology

The methodology used in the case studies is based on a design process for each of the proposed prototypical building types that first meets the minimum requirements and then exceeds the 2008 Standards by 15%. The process includes the following major stages:

Stage 1: Minimum Compliance with 2008 Standards:

Each prototype building design is tested for minimum compliance with the 2008 Standards, and the mix of energy measures are adjusted using common construction options so the building first just meets the Standards. The set of energy measures chosen represent a reasonable combination which reflects how designers, builders and developers are likely to achieve a specified level of performance using a relatively low first incremental (additional) cost.

Stage 2: Incremental Cost for Exceeding 2008 Standards by 15%:

Starting with that set of measures which is minimally compliant with the 2008 Standards, various energy measures are upgraded so that the building just exceeds the 2008 Standards by 15%. The design choices by the consultant authoring this study are based on many years of experience with architects, builders, mechanical engineers; and general knowledge of the relative acceptance and preferences of many measures, as well as their incremental costs. This approach tends to reflect how building energy performance is typically evaluated for code compliance and how it's used to select design energy efficiency measures. Note that lowest simple payback with respect to building site energy is not the primary focus of selecting measures; but rather the requisite reduction of Title 24 Time Dependent Valuation(TDV) energy at a reasonable incremental cost consistent with other non-monetary but important design considerations. A minimum and

maximum range of incremental costs of added energy efficiency measures is established by a variety of research means. A construction cost estimator, Building Advisory LLC, was contracted to conduct research to obtain current measure cost information for many energy measures; and Gabel Associates performed its own additional research to establish first cost data.

Stage 3: Cost Effectiveness Determination:

Energy savings in kWh and therms is calculated from the Title 24 simulation results to establish the annual energy cost savings and CO₂-equivalent reductions in greenhouse gases. A simple payback analysis in years is calculated by dividing the incremental cost for exceeding the 2008 Standards by the estimated annual energy cost savings.

Assumptions

Annual Energy Cost Savings

1. Annual site electricity (kWh) and natural gas (therms) saved are calculated using Micropas 8, state-approved energy compliance software for the 2008 Building Energy Efficiency Standards.
2. Average residential utility rates of \$0.18/kWh for electricity and \$1.15/therm for natural gas in current constant dollars; nonresidential rates are time-of-use rate schedules modeled explicitly in the DOE-2.1E computer simulation: PG&E A-6 schedule for electricity and PG&E G-NR1 schedule for natural gas.
3. No change (i.e., no inflation or deflation) of utility rates in constant dollars
4. No increase in summer temperatures from global climate change

Simple Payback Analysis

1. No external cost of global climate change -- and corresponding value of additional investment in energy efficiency and CO₂ reduction -- is included
2. The cost of money (e.g., opportunity cost) invested in the incremental cost of energy efficiency measures is not included.

3.0 Minimum Compliance with 2008 Standards

The following energy design descriptions of the following building prototypes just meet the 2008 Standards in Climate Zone 3.

Small Single Family House

- ☐ 2,025 square feet
- ☐ 2-story
- ☐ 20.2% glazing/floor area ratio

Energy Efficiency Measures

R-38 Roof w/ Radiant Barrier
R-13 Walls
R-30 Raised Floor over Garage/Open at 2nd Floor
R-0 Slab on Grade
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
Furnace: 80% AFUE
Air Conditioner: None
R-8 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
50 Gallon Gas Water Heater: EF=0.62

Large Single Family House

- ☐ 4,500 square feet
- ☐ 2-story
- ☐ 22.0% glazing/floor area ratio

Energy Efficiency Measures

R-30 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(2) Furnaces: 80% AFUE
Air Conditioner: None
R-6 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
(2) 50 Gallon Gas Water Heaters: EF=0.61

Low-rise Multi-family Apartments

- ☐ 8,442 square feet
- ☐ 8 units/2-story
- ☐ 12.5% glazing/floor area ratio

Energy Efficiency Measures
R-30 Roof w/ Radiant Barrier
R-13 Walls
R-0 Slab on Grade
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(8) Furnaces: 80% AFUE
Air Conditioner: None
R-6 Attic Ducts
(8) 40 Gallon Gas Water Heaters: EF=0.63
Pipe Insulation

High-rise Multifamily Apartments

- ☐ 36,800 sf,
- ☐ 40 units
- ☐ 4-story
- ☐ Window to Wall Ratio = 35.2%

Energy Efficiency Measures to Meet Title 24
R-19 under Metal Deck and additional R-11 batt below (no framing); with Cool Roof Reflectance = 0.55, Emittance = 0.75
R-19 in Metal Frame Walls
R-4 (1.25" K-13 spray-on) Raised Slab over parking garage
Dual Metal Windows: default U-factor=0.79, SHGC COG = 0.38
1.5 ton 4-pipe fan coils, 80% AFUE boiler, 70-ton scroll air cooled chiller @ 0.72 KW/ton
Central DHW boiler: 80% AFUE and recirculating system w/ timer-temperature controls

Low-rise Office Building

- ☐ Single Story
- ☐ 10,580 sf,
- ☐ Window to Wall Ratio = 37.1%

Energy Efficiency Measures to Meet Title 24
R-19 under Metal Deck, no cool roof
R-19 in Metal Frame Walls
R-0 (un-insulated) slab-on-grade 1st floor
Metal windows: Default glazing U=0.71, COG SHGC=0.54
Lighting = 0.858 w/sf: Open Office Areas: (60) 2-lamp T8 fixtures @58w each; (24) 18w recessed CFLs no lighting controls. Small Offices: (56) 2-lamp T8 fixtures; (40) 18w recessed CFLs, on/off lighting controls. Support Areas: (32) 18w recessed CFLs; (48) 13w CFL wall sconces; no controls.
(3) 10-ton DX units EER=11.0; 80% AFUE furnaces; standard efficiency fan motors; fixed temp. integrated air economizers
R-6 duct insulation w/ ducts on roof
(1) Tank Gas Water Heaters EF=0.58

High-rise Office Building

- ☐ 5-story
- ☐ 52,900 sf,
- ☐ Window to Wall Ratio = 34.5%

Design "A" for Options 1 and 2

Energy Efficiency Measures to Meet Title 24
R-19 under Metal Deck, no cool roof
R-19 in Metal Frame Walls
R-0 (un-insulated) slab-on-grade 1st floor
Metal windows: Default glazing U=0.71, SHGC = 0.73
Lighting = 0.858 w/sf: Open Office Areas: (300) 2-lamp T8 fixtures @58w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs no lighting on/off lighting controls. Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.
(3) 60 ton Packaged VAV system 10 EER/80% TE, standard efficiency variable speed fan motors; 20% VAV boxes, electric water reheat on perimeter zones
R-6 duct insulation w/ ducts in conditioned
(1) Tank Gas Water Heaters EF=0.58

Design "B" for Options 3, 4 and 5

Energy Efficiency Measures to Meet Title 24
R-19 under Metal Deck, no cool roof
R-19 in Metal Frame Walls
R-0 (un-insulated) slab-on-grade 1st floor
Metal windows: Default glazing U=0.71, SHGC = .73
Lighting = 0.858 w/sf: Open Office Areas: (300) 2-lamp T8 fixtures @58w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs no lighting on/off lighting controls. Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.
(3) 60 ton Packaged VAV system 10 EER/80% TE, standard efficiency variable speed fan motors; 25% VAV boxes, hot water reheat on perimeter zones with 80% AFUE boiler.
R-6 duct insulation w/ ducts in conditioned
DHW 80% AFUE boiler

4.0 Incremental Cost to Exceed 2008 Standards by 15%

The following tables list the energy features and/or equipment included in the 2008 Standards base design, the efficient measure options, and an estimate of the incremental cost for each measure included **to improve the building performance to use 15% less TDV energy than the corresponding Title 24 base case design.**

Small Single Family House

- ☐ 2,025 square feet
- ☐ 2-story
- ☐ 20.2% glazing/floor area ratio

Incremental Cost Estimate to Exceed Title 24 by 15%

Single Family Prototype: 2,025 SF, Option 1

2025 sf

Climate Zone 3

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	\$ -	\$ -	\$ -
R-19 Walls (from R-13): 2,550 sf @\$0.31 to \$0.54/sf	Upgrade	\$ 791	\$ 1,377	\$ 1,084
R-30 Raised Floor over Garage/Open at 2nd Floor	-	\$ -	\$ -	\$ -
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
Furnace: 92% AFUE (from 80% AFUE)	Upgrade	\$ 500	\$ 1,200	\$ 850
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-6 Attic Ducts (from R-8)	Downgrade	\$ (325)	\$ (225)	\$ (275)
Reduced Duct Leakage/Testing (HERS)	-	\$ -	\$ -	\$ -
50 Gallon Gas Water Heater: EF=0.62	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 966	\$ 2,352	\$ 1,659
Total Incremental Cost per Square Foot:		\$ 0.48	\$ 1.16	\$ 0.82

Incremental Cost Estimate to Exceed Title 24 by 15%

Single Family Prototype: 2,025 SF, Option 2

2025 sf

Climate Zone 3

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	\$ -	\$ -	\$ -
R-19 Walls (from R-13): 2,550 sf @\$0.31 to \$0.54/sf	Upgrade	\$ 791	\$ 1,377	\$ 1,084
R-30 Raised Floor over Garage/Open at 2nd Floor	-	\$ -	\$ -	\$ -
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
Furnace: 80% AFUE	-	\$ -	\$ -	\$ -
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-4.2 Attic Ducts (from R-8)	Downgrade	\$ (650)	\$ (450)	\$ (550)
Reduced Duct Leakage/Testing (HERS)	-	\$ -	\$ -	\$ -
Instantaneous Gas Water Heater: RE=0.80 (from 50 Gal Gas: EF=0.62)	Upgrade	\$ 900	\$ 1,500	\$ 1,200
Total Incremental Cost of Energy Efficiency Measures:		\$ 1,041	\$ 2,427	\$ 1,734
Total Incremental Cost per Square Foot:		\$ 0.51	\$ 1.20	\$ 0.86

Incremental Cost Estimate to Exceed Title 24 by 15%
Single Family Prototype: 2,025 SF, Option 3

2025 sf

Climate Zone 3

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	\$ -	\$ -	\$ -
R-21 Walls (from R-13): 2,550 sf @ \$0.45 to \$0.70/sf	Upgrade	\$ 1,148	\$ 1,785	\$ 1,466
R-30 Raised Floor over Garage/Open at 2nd Floor	-	\$ -	\$ -	\$ -
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
Furnace: 90% AFUE (from 80% AFUE)	Upgrade	\$ 500	\$ 1,000	\$ 750
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-4.2 Attic Ducts (from R-8)	Downgrade	\$ (650)	\$ (450)	\$ (550)
Reduced Duct Leakage/Testing (HERS)	-	\$ -	\$ -	\$ -
50 Gallon Gas Water Heater: EF=0.61 (from EF=0.62)	Downgrade	\$ (100)	\$ (50)	\$ (75)
Total Incremental Cost of Energy Efficiency Measures:		\$ 898	\$ 2,285	\$ 1,591
Total Incremental Cost per Square Foot:		\$ 0.44	\$ 1.13	\$ 0.79

Large Single Family House

- ☐ 4,500 square feet
- ☐ 2-story
- ☐ 22.0% glazing/floor area ratio

Incremental Cost Estimate to Exceed Title 24 by 15%
Single Family Prototype: 4,500 SF, Option 1

4500 sf

Climate Zone 3

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-30 w/ Radiant Barrier): 2,700 sf @ 0.15 to 0.20/sf	Upgrade	\$ 405	\$ 540	\$ 473
R-21 Walls (from R-13): 2,518 sf @ \$0.45 to \$0.70/sf	Upgrade	\$ 1,133	\$ 1,763	\$ 1,448
R-30 Raised Floor (from R-19): 2,700 sf @ \$0.25 to \$0.35	Upgrade	\$ 675	\$ 945	\$ 810
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(2) Furnaces: 80% AFUE	-	\$ -	\$ -	\$ -
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-8 Attic Ducts (from R-6)	Upgrade	\$ 450	\$ 650	\$ 550
Reduced Duct Leakage/Testing (HERS)	-	\$ -	\$ -	\$ -
(2) 50 Gallon Gas Water Heaters: EF=0.62 (from EF=0.61)	Upgrade	\$ 100	\$ 200	\$ 150
Total Incremental Cost of Energy Efficiency Measures:		\$ 2,763	\$ 4,098	\$ 3,430
Total Incremental Cost per Square Foot:		\$ 0.61	\$ 0.91	\$ 0.76

Incremental Cost Estimate to Exceed Title 24 by 15%
Single Family Prototype: 4,500 SF, Option 2

4500 sf

Climate Zone 3

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-30 w/ Radiant Barrier): 2,700 sf @ 0.15 to 0.20/sf	Upgrade	\$ 405	\$ 540	\$ 473
R-15 Walls (from R-13): 2,518 sf @ \$0.14 to \$0.18/sf	Upgrade	\$ 353	\$ 453	\$ 403
R-30 Raised Floor (from R-19): 2,700 sf @ \$0.25 to \$0.35	Upgrade	\$ 675	\$ 945	\$ 810
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(2) Furnaces: 92% AFUE (from 80% AFUE)	Upgrade	\$ 1,000	\$ 2,400	\$ 1,700
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-8 Attic Ducts (from R-6)	Upgrade	\$ 450	\$ 650	\$ 550
Reduced Duct Leakage/Testing (HERS)	-	\$ -	\$ -	\$ -
(2) 50 Gallon Gas Water Heaters: EF=0.63 (from EF=0.61)	Upgrade	\$ 100	\$ 300	\$ 200
Total Incremental Cost of Energy Efficiency Measures:		\$ 2,983	\$ 5,288	\$ 4,135
Total Incremental Cost per Square Foot:		\$ 0.66	\$ 1.18	\$ 0.92

Incremental Cost Estimate to Exceed Title 24 by 15%
Single Family Prototype: 4,500 SF, Option 3

4500 sf

Climate Zone 3

Energy Efficiency Measures	Change	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-30 w/ Radiant Barrier): 2,700 sf @ 0.15 to 0.20/sf	Upgrade	\$ 405	\$ 540	\$ 473
R-19 Walls (from R-13): 2,518 sf @ \$0.31 to \$0.54/sf	Upgrade	\$ 781	\$ 1,360	\$ 1,070
R-19 Raised Floor	-	\$ -	\$ -	\$ -
Quality Insulation Installation (HERS)	Upgrade	\$ 900	\$ 1,200	\$ 1,050
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(2) Furnaces: 80% AFUE	-	\$ -	\$ -	\$ -
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-6 Attic Ducts	-	\$ -	\$ -	\$ -
Reduced Duct Leakage/Testing (HERS)	-	\$ -	\$ -	\$ -
(2) 50 Gallon Gas Water Heaters: EF=0.63 (from EF=0.61)	Upgrade	\$ 100	\$ 300	\$ 200
Total Incremental Cost of Energy Efficiency Measures:		\$ 2,186	\$ 3,400	\$ 2,793
Total Incremental Cost per Square Foot:		\$ 0.49	\$ 0.76	\$ 0.62

Low-rise Multi-family Apartments

- ☐ 8,442 square feet
- ☐ 8 units/2-story
- ☐ 12.5% glazing/floor area ratio

Incremental Cost Estimate to Exceed Title 24 by 15%

Multi-Family Prototype: 8,442 SF, Option 1

8442 sf

Climate Zone 3

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Roof w/ Radiant Barrier	-	\$ -	\$ -	\$ -
R-21 Walls (from R-13): 10,146 sf @ \$0.45 to \$0.70/sf	Upgrade	\$ 4,566	\$ 7,102	\$ 5,834
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(8) Furnaces: 80% AFUE	-	\$ -	\$ -	\$ -
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-4.2 Attic Ducts (from R-6)	Downgrade	\$ (1,600)	\$ (1,000)	\$ (1,300)
Reduced Duct Leakage/Testing (HERS)	Upgrade	\$ 2,400	\$ 4,800	\$ 3,600
(8) 40 Gallon Gas Water Heaters: EF=0.63	-	\$ -	\$ -	\$ -
Remove Pipe Insulation	Downgrade	\$ (1,600)	\$ (1,200)	\$ (1,400)
Total Incremental Cost of Energy Efficiency Measures:		\$ 3,766	\$ 9,702	\$ 6,734
Total Incremental Cost per Square Foot:		\$ 0.45	\$ 1.15	\$ 0.80

Incremental Cost Estimate to Exceed Title 24 by 15%

Multi-Family Prototype: 8,442 SF, Option 2

8442 sf

Climate Zone 3

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-30 w/Radiant Barrier): 4,221 sf @ 0.15 to 0.20/sf	Upgrade	\$ 633	\$ 844	\$ 739
R-19 Walls (from R-13): 10,146 sf @ \$0.31 to \$0.54/sf	Upgrade	\$ 3,145	\$ 5,479	\$ 4,312
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(8) Furnaces: 80% AFUE	-	\$ -	\$ -	\$ -
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-6 Attic Ducts	-	\$ -	\$ -	\$ -
Reduced Duct Leakage/Testing (HERS)	Upgrade	\$ 2,400	\$ 4,800	\$ 3,600
(8) 40 Gallon Gas Water Heaters: EF=0.63	-	\$ -	\$ -	\$ -
Remove Pipe Insulation	Downgrade	\$ (1,600)	\$ (1,200)	\$ (1,400)
Total Incremental Cost of Energy Efficiency Measures:		\$ 4,578	\$ 9,923	\$ 7,251
Total Incremental Cost per Square Foot:		\$ 0.54	\$ 1.18	\$ 0.86

Incremental Cost Estimate to Exceed Title 24 by 15%
Multi-Family Prototype: 8,442 SF, Option 3

8442 sf

Climate Zone 3

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 Roof w/ Radiant Barrier (from R-30 w/Radiant Barrier): 4,221 sf @ 0.25 to 0.35/sf	Downgrade	\$ (1,477)	\$ (1,055)	\$ (1,266)
R-19 Walls (from R-13): 10,146 sf @ \$0.31 to \$0.54/sf	Upgrade	\$ 3,145	\$ 5,479	\$ 4,312
R-0 Slab on Grade	-	\$ -	\$ -	\$ -
Low E2 Vinyl, U=0.36, SHGC=0.30	-	\$ -	\$ -	\$ -
(8) Furnaces: 90% AFUE (from 80% AFUE)	Upgrade	\$ 4,000	\$ 8,000	\$ 6,000
Air Conditioner: None	-	\$ -	\$ -	\$ -
R-4.2 Attic Ducts (from R-6)	Downgrade	\$ (1,600)	\$ (1,000)	\$ (1,300)
Reduced Duct Leakage/Testing (HERS)	Upgrade	\$ 2,400	\$ 4,800	\$ 3,600
(8) 40 Gallon Gas Water Heaters: EF=0.62 (from EF=0.63)	Downgrade	\$ (400)	\$ -	\$ (200)
Remove Pipe Insulation	Downgrade	\$ (1,600)	\$ (1,200)	\$ (1,400)
Total Incremental Cost of Energy Efficiency Measures:		\$ 4,468	\$ 15,024	\$ 9,746
Total Incremental Cost per Square Foot:		\$ 0.53	\$ 1.78	\$ 1.15

High-rise Multifamily Apartments

- ☐ 36,800 sf,
- ☐ 40 units/4-story
- ☐ Window to Wall Ratio = 31.6%

Incremental Cost Estimate to Exceed Title 24 by 15%
High-rise Residential Prototype: 36,800 SF, Option 1

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-30 batt below (no framing); with Cool Roof Reflectance = 0.55, Emittance = 0.75; 9,200 sf @ \$0.30 to \$0.40/sf	Upgrade	\$ 2,760	\$ 3,680	\$ 3,220
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-4 (1.25" K-13 spray-on) Raised Slab over parking garage	-	\$ -	\$ -	\$ -
Dual Metal Windows: COG U-factor=0.3, COG SHGC=0.27 6,240 sf @ \$2.00 to \$3.00/sf	Upgrade	\$ 12,480	\$ 18,720	\$ 15,600
1.5 ton 4-pipe fan coil, 98% AFUE boiler, 60-ton scroll air cooled chiller 0.72 KW/ton (cost of boiler below under DHW)	Upgrade	\$ -	\$ -	\$ -
Central DHW boiler: 98% AFUE and recirculating system w/ timer-temperature controls	Upgrade	\$ 4,000	\$ 8,000	\$ 6,000
Total Incremental Cost of Energy Efficiency Measures:		\$ 19,240	\$ 30,400	\$ 24,820
Total Incremental Cost per Square Foot:		\$ 0.52	\$ 0.83	\$ 0.67

Incremental Cost Estimate to Exceed Title 24 by 15%
High-rise Residential Prototype: 36,800 SF, Option 2

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-11 batt below (no framing); with no cool roof; 9,200 sf @ \$0.35 to \$0.50/sf	Downgrade	\$ (3,220)	\$ (4,600)	\$ (3,910)
R-19 in Metal Frame Walls w/ 1" continuous outside (R-5); 12,112 sf @ \$4.00/sf to \$7.00/sf	Upgrade	\$ 48,448	\$ 84,784	\$ 66,616
R-4 (1.25" K-13 spray-on) Raised Slab over parking garage	-	\$ -	\$ -	\$ -
Dual Metal Windows: COG U-factor=0.3, COG SHGC=0.31 6,240 sf @ \$1.00 to \$2.00/sf	Upgrade	\$ 6,240	\$ 12,480	\$ 9,360
1.5 ton 4-pipe fan coil, 98% AFUE boiler, 60-ton scroll air cooled chiller 0.72 KW/ton (cost of boiler below under DHW)	Upgrade	\$ -	\$ -	\$ -
Central DHW boiler: 98% AFUE and recirculating system w/ timer-temperature controls	Upgrade	\$ 4,000	\$ 8,000	\$ 6,000
Total Incremental Cost of Energy Efficiency Measures:		\$ 55,468	\$100,664	\$ 78,066
Total Incremental Cost per Square Foot:		\$ 1.51	\$ 2.74	\$ 2.12

Incremental Cost Estimate to Exceed Title 24 by 15%
High-rise Residential Prototype: 36,800 SF, Option 3

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-30 batt below (no framing); with Cool Roof Reflectance = 0.55, Emittance = 0.75; 9,200 sf @ \$0.30 to \$0.40/sf	Upgrade	\$ 2,760	\$ 3,680	\$ 3,220
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-4 (1.25" K-13 spray-on) Raised Slab over parking garage	-	\$ -	\$ -	\$ -
Dual Metal Windows: COG U-factor=0.3, COG SHGC=0.38 6,240 sf @ \$0.50 to \$1.00/sf	Upgrade	\$ 3,120	\$ 6,240	\$ 4,680
1.5 ton 4-pipe fan coil, 94% AFUE boiler, 70-ton scroll air cooled chiller 0.72 KW/ton	Upgrade	\$ 3,000	\$ 6,000	\$ 4,500
Central DHW boiler: 94% AFUE and recirculating system w/ timer-temperature controls and solar water heating, 25% Net Solar Fraction (cost of boiler above under space heating boiler)	Upgrade	\$ 40,000	\$ 55,000	\$ 47,500
Total Incremental Cost of Energy Efficiency Measures:		\$ 48,880	\$ 70,920	\$ 59,900
Total Incremental Cost per Square Foot:		\$ 1.33	\$ 1.93	\$ 1.63

Low-rise Office Building

- ☐ Single Story
- ☐ 10,580 sf,
- ☐ Window to Wall Ratio = 37.1%

Incremental Cost Estimate to Exceed Title 24 by 15%

Nonresidential Prototype: 10,580 SF, Option 1

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-13 batt below (no framing); with Cool Roof Reflectance = 0.55, Emittance = 0.75; 10,580 sf @ \$0.60 to \$0.85/sf	Upgrade	\$ 6,348	\$ 8,993	\$ 7,671
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: default U=0.71, COG SHGC=0.38; 3,200 sf @ \$1.50 to \$2.00/sf	Upgrade	\$ 4,800	\$ 6,400	\$ 5,600
Lighting = 0.783 w/sf: Open Office Areas: (60) 2-lamp T8 fixtures @58w each; (24) 18w recessed CFLs no lighting controls. Small Offices: (56) 2-lamp T8 fixtures, (40) 18w recessed CFLs: (28) multi-level occupancy sensors on T8s and recessed CFLa @ \$75 to \$100 each. Support Areas: (32) 18w recessed CFLs; (48) 13w CFL wall sconces; no controls.	Upgrade	\$ 2,100	\$ 2,800	\$ 2,450
(3) 10-ton DX units EER=11.0; 80% AFUE furnaces; standard efficiency fan motors; fixed temp. integrated air economizers	-	\$ -	\$ -	\$ -
R-6 duct insulation w/ducts on roof, HERS verified duct leakage	Upgrade	\$ 1,000	\$ 1,800	\$ 1,400
(1) Tank Gas Water Heaters EF=0.58	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 14,248	\$ 19,993	\$ 17,121
Total Incremental Cost per Square Foot:		\$ 1.35	\$ 1.89	\$ 1.62

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 10,580 SF, Option 2

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-25 batt below (no framing); with Cool Roof Reflectance = 0.55, Emittance = 0.75; 10,580 sf @ \$0.75 to \$1.10/sf	Upgrade	\$ 7,935	\$ 11,638	\$ 9,787
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: default U=0.71, COG SHGC=0.27 ; 3,200 sf @ \$2.00 to \$3.00/sf	Upgrade	\$ 6,400	\$ 9,600	\$ 8,000
Lighting = 0.858 w/sf: Open Office Areas: (60) 2-lamp T8 fixtures @58w each; (24) 18w recessed CFLs no lighting controls. Small Offices: (56) 2-lamp T8 fixtures; (40) 18w recessed CFLs, on/off lighting controls. Support Areas: (32) 18w recessed CFLs; (48) 13w CFL wall sconces; no controls.	-	\$ -	\$ -	\$ -
(3) 10-ton DX units EER=11.0; 80% AFUE furnaces; standard efficiency fan motors; fixed temp. integrated air economizers, Controls to include "Cycle on at night"	Upgrade	\$ 300	\$ 600	\$ 450
R-6 duct insulation w/ducts on roof, HERS verified duct leakage	Upgrade	\$ 1,000	\$ 1,800	\$ 1,400
(1) Tank Gas Water Heaters EF=0.58	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 15,635	\$ 23,638	\$ 19,637
Total Incremental Cost per Square Foot:		\$ 1.48	\$ 2.23	\$ 1.86

Incremental Cost Estimate to Exceed Title 24 by 15%

Nonresidential Prototype: 10,580 SF, Option 3

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-13 batt below (no framing); no cool roof; 10,580 sf @ \$0.25 to \$0.35/sf	Upgrade	\$ 2,645	\$ 3,703	\$ 3,174
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: default U=0.71, COG SHGC=0.38 ; 3,200 sf @ \$1.50 to \$2.00/sf	Upgrade	\$ 4,800	\$ 6,400	\$ 5,600
Lighting = 0.746 w/sf: Open Office Areas: (32) HO 2-lamp T8 fixtures @74w each ; (24) 18w recessed CFLs no lighting controls. Small Offices: (56) 2-lamp T8 fixtures, (40) 18w recessed CFLs: (28) multi-level occupancy sensors on T8s and recessed CFLa @ \$75 to \$100 each . Support Areas: (32) 18w recessed CFLs; (48) 13w CFL wall sconces; no controls.	Upgrade	\$ 820	\$ 1,648	\$ 1,234
(3) 10-ton DX units EER=11.0; 80% AFUE furnaces; standard efficiency fan motors; fixed temp. integrated air economizers, Controls to include "Cycle on at night"	Upgrade	\$ 300	\$ 600	\$ 450
R-6 duct insulation w/ ducts on roof	-			
(1) Tank Gas Water Heaters EF=0.58	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 8,565	\$ 12,351	\$ 10,458
Total Incremental Cost per Square Foot:		\$ 0.81	\$ 1.17	\$ 0.99

High-rise Office Building

- ☐ 5-story
- ☐ 52,900 sf,
- ☐ Window to Wall Ratio = 34.5%

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 52,900 SF, Option 1

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck with Cool Roof Reflectance = 0.55, Emittance = 0.75; 10,580 sf @ \$0.35 to \$0.50/sf	Upgrade	\$ 3,703	\$ 5,290	\$ 4,497
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: default U=0.71, COG SHGC=0.38; 16,000 sf @ \$2.00 to \$2.50/sf	Upgrade	\$ 32,000	\$ 40,000	\$ 36,000
Lighting = 0.858 w/sf. Open Office Areas: (300) 2-lamp T8 fixtures @58w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs no lighting on/off lighting controls. Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.	-	\$ -	\$ -	\$ -
(3) 60 ton Packaged VAV system 10 EER/80% TE, standard efficiency variable speed fan motors; 15% VAV boxes , electric water reheat on perimeter zones	Upgrade	\$ 26,450	\$ 39,675	\$ 33,063
R-6 duct insulation w/ ducts in conditioned	-	\$ -	\$ -	\$ -
(1) Tank Gas Water Heaters EF=0.58	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 62,153	\$ 84,965	\$ 73,559
Total Incremental Cost per Square Foot:		\$ 1.17	\$ 1.61	\$ 1.39

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 52,900 SF, Option 2

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-13 batt below (no framing) ; no cool roof; 10,580 sf @ \$0.25 to \$0.35/sf	Upgrade	\$ 2,645	\$ 3,703	\$ 3,174
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: default U=0.71, COG SHGC=0.54 ; 16,000 sf @ \$1.50 to \$2.00/sf	Upgrade	\$ 24,000	\$ 32,000	\$ 28,000
Lighting = 0.783 w/sf: Open Office Areas: (300) 2-lamp T8 fixtures @58w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs multi-level occupancy sensors on T8s and recessed CFLs @ \$75 to \$100 each . Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.	Upgrade	\$ 10,500	\$ 14,000	\$ 12,250
(3) 60 ton Packaged VAV system 10 EER/80% TE, standard efficiency variable speed fan motors; 15% VAV boxes , electric water reheat on perimeter zones	Upgrade	\$ 26,450	\$ 52,900	\$ 39,675
R-6 duct insulation w/ ducts in conditioned	-	\$ -	\$ -	\$ -
(1) Tank Gas Water Heaters EF=0.58	-	\$ -	\$ -	\$ -
Total Incremental Cost of Energy Efficiency Measures:		\$ 63,595	\$ 102,603	\$ 83,099
Total Incremental Cost per Square Foot:		\$ 1.20	\$ 1.94	\$ 1.57

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 52,900 SF, Option 3

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-13 batt below (no framing) ; no cool roof; 10,580 sf @ \$0.25 to \$0.35/sf	Upgrade	\$ 2,645	\$ 3,703	\$ 3,174
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: default U=0.71, COG SHGC=0.54 ; 16,000 sf @ \$1.50 to \$2.00/sf	Upgrade	\$ 24,000	\$ 32,000	\$ 28,000
Lighting = 0.858 w/sf: Open Office Areas: (300) 2-lamp T8 fixtures @58w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs no lighting on/off lighting controls. Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.	-	\$ -	\$ -	\$ -
(3) 60 ton Packaged VAV system 10 EER/80% TE, standard efficiency variable speed fan motors; 20% VAV boxes , hot water reheat on perimeter zones with 92% AFUE boiler (cost of boiler included below for DHW)	Upgrade	\$ 26,450	\$ 52,900	\$ 39,675
R-6 duct insulation w/ ducts in conditioned	-	\$ -	\$ -	\$ -
DHW 92% AFUE boiler	Upgrade	\$ 2,000	\$ 4,000	\$ 3,000
Total Incremental Cost of Energy Efficiency Measures:		\$ 55,095	\$ 92,603	\$ 73,849
Total Incremental Cost per Square Foot:		\$ 1.04	\$ 1.75	\$ 1.40

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 52,900 SF, Option 4

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-13 batt below (no framing); with Cool Roof Reflectance = 0.55, Emittance = 0.75; 10,580 sf @ \$0.60 to \$0.85/sf	Upgrade	\$ 6,348	\$ 8,993	\$ 7,671
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: default U=0.71, COG SHGC=0.54 ; 16,000 sf @ \$1.50 to \$2.00/sf	Upgrade	\$ 24,000	\$ 32,000	\$ 28,000
Lighting = 0.783 w/sf: Open Office Areas: (300) 2-lamp T8 fixtures @58w each; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs multi-level occupancy sensors on T8s and recessed CFLs @ \$75 to \$100 each . Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.	Upgrade	\$ 10,500	\$ 14,000	\$ 12,250
(3) 60 ton Packaged VAV system 10 EER/80% TE, standard efficiency variable speed fan motors; 25% VAV boxes, hot water reheat on perimeter zones with 92% AFUE boiler (cost of boiler included below for DHW).	Upgrade	\$ -	\$ -	\$ -
R-6 duct insulation w/ ducts in conditioned	-	\$ -	\$ -	\$ -
DHW 92% AFUE boiler	Upgrade	\$ 2,000	\$ 4,000	\$ 3,000
Total Incremental Cost of Energy Efficiency Measures:		\$ 42,848	\$ 58,993	\$ 50,921
Total Incremental Cost per Square Foot:		\$ 0.81	\$ 1.12	\$ 0.96

Incremental Cost Estimate to Exceed Title 24 by 15%
Nonresidential Prototype: 52,900 SF, Option 5

Climate Zone 3

Energy Efficiency Measures to Exceed Title 24 by 15%	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-19 under Metal Deck and additional R-13 batt below (no framing); with Cool Roof Reflectance = 0.55, Emittance = 0.75; 10,580 sf @ \$0.60 to \$0.85/sf	Upgrade	\$ 6,348	\$ 8,993	\$ 7,671
R-19 in Metal Frame Walls	-	\$ -	\$ -	\$ -
R-0 (un-insulated) slab-on-grade 1st floor	-	\$ -	\$ -	\$ -
Metal windows: default U=0.71, COG SHGC=0.54 ; 16,000 sf @ \$1.50 to \$2.00/sf	Upgrade	\$ 24,000	\$ 32,000	\$ 28,000
Lighting = 0.678 w/sf: Open Office Areas: (160) 2-lamp T8 fixtures @74w each ; no lighting controls; (120) 18w recessed CFLs no lighting controls. Small Offices: (280) 2-lamp T8 58w fixtures on/off lighting controls; (200) 18w recessed CFLs multi-level occupancy sensors on T8s and recessed CFLs @ \$75 to \$100 each . Support Areas: (160) 18w recessed CFLs no lighting controls; (240) 13w CFL wall sconces; no lighting controls.	Upgrade	\$ 10,500	\$ 14,000	\$ 12,250
(3) 60 ton Packaged VAV system 10 EER/80% TE, standard efficiency variable speed fan motors; 25% VAV boxes, hot water reheat on perimeter zones with 94% AFUE boiler (cost of boiler included below for DHW).	Upgrade	\$ -	\$ -	\$ -
R-6 duct insulation w/ ducts in conditioned	-	\$ -	\$ -	\$ -
DHW 94% AFUE boiler	Upgrade	\$ 4,000	\$ 8,000	\$ 6,000
Total Incremental Cost of Energy Efficiency Measures:		\$ 44,848	\$ 62,993	\$ 53,921
Total Incremental Cost per Square Foot:		\$ 0.85	\$ 1.19	\$ 1.02

5.0 Cost -Effectiveness Determination

Regardless of the building design, occupancy profile and number of stories, the incremental improvement in overall annual energy performance of buildings in exceeding the 2008 Standards is determined to be cost-effective. However, each building's overall design, occupancy type and specific design choices may allow for a large range of incremental costs for exceeding 2008 Standards, estimated annual energy cost savings, and subsequent payback period.

Small Single Family

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
2,025 sf (Option 1)	78	85	\$1,659	\$112	14.8
2,025 sf (Option 2)	72	87	\$1,734	\$113	15.3
2,025 sf (Option 3)	85	81	\$1,592	\$108	14.7
Averages:	78	84	\$1,662	\$111	15.0

Annual Reduction in CO2-equivalent: 0.50 lb./sq.ft.-year, 1,017 lb./building-year

Increased Cost / lb. CO2-e reduction: \$1.63

Large Single Family

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
4,500 sf (Option 1)	181	105	\$3,431	\$153	22.4
4,500 sf (Option 2)	88	117	\$4,136	\$150	27.5
4,500 sf (Option 3)	172	106	\$2,793	\$153	18.3
Averages:	147	109	\$3,453	\$152	22.7

Annual Reduction in CO2-equivalent: 0.30 lb./sq.ft.-year, 1,339 lb./building-year

Increased Cost / lb. CO2-e reduction: \$2.58

Low-rise Multi-family Apartments

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
8-Unit, 8,442 sf (Option 1)	569	345	\$6,734	\$499	13.5
8-Unit, 8,442 sf (Option 2)	552	342	\$7,251	\$493	14.7
8-Unit, 8,442 sf (Option 3)	453	337	\$9,746	\$469	20.8
8-Unit, 8,442 sf (Option 4)	57	396	\$8,323	\$466	17.9
Averages:	354	358	\$8,440	\$476	17.8

Annual Reduction in CO2-equivalent: 0.51 lb./sq.ft.-year, 4,316 lb./building-year

Increased Cost / lb. CO2-e reduction: \$1.86

High-rise Multi-family Apartments

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
36,800 sf (Option 1)	668	1766	\$24,820	\$2,151	11.5
36,800 sf (Option 2)	-2616	2314	\$78,066	\$2,190	35.6
36,800 sf (Option 3)	-2519	2811	\$51,940	\$2,779	18.7
Averages:	-1489	2297	\$51,609	\$2,374	22.0

Annual Reduction in CO2-equivalent: 0.71 lb./sq.ft.-year, 26,067 lb./building-year
Increased Cost / lb. CO2-e reduction: \$1.97

Low-rise Office Building

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
10,580 sf (Option 1)	10410	-79	\$17,121	\$2,765	6.2
10,580 sf (Option 2)	8612	-182	\$19,637	\$2,247	8.7
10,580 sf (Option 3)	10594	-223	\$10,458	\$2,475	4.2
Averages:	9872	-161	\$15,738	\$2,496	6.4

Annual Reduction in CO2-equivalent: 0.24 lb./sq.ft.-year, 2,564 lb./building-year
Increased Cost / lb. CO2-e reduction: \$7.17

High-rise Office Building

Building Description	Total Annual KWh Saving	Total Annual Therms Saving	Incremental First Cost (\$)	Annual Energy Cost Savings (\$)	Simple Payback (Years)
52,900 sf (Option 1)	76452	-16	\$73,559	\$17,629	4.2
52,900 sf (Option 2)	74762	-3	\$83,099	\$16,457	5.0
52,900 sf (Option 3)	40583	4523	\$73,849	\$16,248	4.5
52,900 sf (Option 4)	55173	2217	\$50,921	\$34,725	1.5
52,900 sf (Option 5)	40996	4871	\$53,921	\$31,964	1.7
Averages:	57593	2318	\$67,070	\$23,405	3.4

Annual Reduction in CO2-equivalent: 1.34 lb./sq.ft.-year, 70,667 lb./building-year
Increased Cost / lb. CO2-e reduction: \$0.95

Conclusions

Regardless of the building design, occupancy profile and number of stories, the incremental improvement in overall annual energy performance of buildings which exceed the 2008 Title 24 Building Energy Efficiency Standards by 15% appears cost-effective. However, each building's overall design, occupancy type and specific design choices may allow for a large range of incremental first cost and payback. As with simply meeting the requirements of the Title 24 energy standards, a permit applicant complying with the energy requirements of a green building ordinance should carefully analyze building energy performance to reduce incremental first cost and the payback for the required additional energy efficiency measures.